Alcatel-Lucent 9500 MPR – Microwave Packet Radio

Alcatel·Lucent

Streamlined, Cost-Effective
Microwave IP Transformation

This microwave packet radio (MPR) product enables smooth transformation of backhaul networks from TDM to IP — and provides efficient transport of multimedia traffic, while still supporting legacy TDM. It improves packet aggregation, increases bandwidth, optimizes Ethernet connectivity and delivers the quality of service needed to satisfy end users. With the Alcatel-Lucent 9500 MPR product, networks can efficiently absorb rapid growth in multimedia traffic, because packets are handled natively and transmission is adapted to the propagation conditions and quality required by different types of services.

# Meet a Key Backhaul Challenge – The Rapid Growth of Multimedia Traffic

The mobile market is changing, and to remain competitive, mobile service providers must deliver new profitable services and reduce their backhaul costs. Mobile user demand continues to move beyond basic data services like instant messaging and e-mail to more delay sensitive applications like media streaming and real-time multimedia. In response, broadband wireless technologies including high-speed packet access (HSxPA) and evolution data optimized (EV-DO) are evolving to enable higher transmission speeds and packet interfaces. Backhaul networks must evolve to meet these new bandwidth demands at acceptable cost points.

IP transport can help mobile providers transform their networks — to better manage the increasing traffic demands of broadband services. To satisfy the need for new packet backhaul solutions, Alcatel-Lucent offers a revolutionary way of transporting packets natively. With this new approach, the Alcatel-Lucent 9500 MPR product can assure the quality of service required for each traffic type, dramatically reduce OPEX and improve the connectivity of Ethernet and legacy E1 base stations. As a result, your network can absorb rapid growth in multimedia traffic easily and efficiently, with a smooth migration from TDM to IP.

Figure 1. TDM Transport compared to Packet Aggregation. There is a clear gain in scarce radio resources when transporting packet traffic natively. Packet solutions can absorb TDM traffic efficiently while TDM solutions cannot handle packet traffic cost-efficiently.
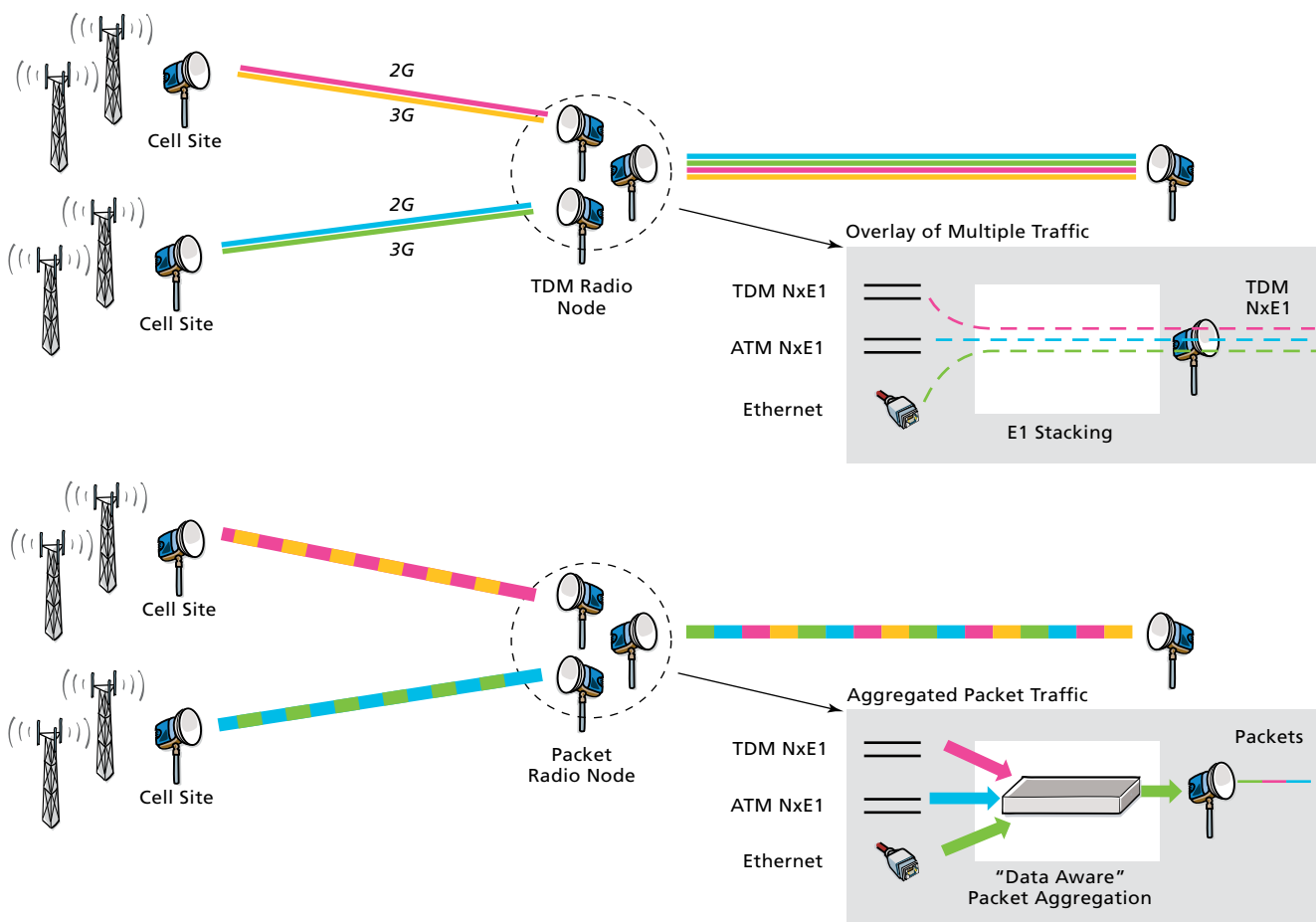
The Need for IP Transformation

The growing demand for new broadband services requires more connectivity and additional ports at cell sites. Packet traffic growth from these new broadband services drives bandwidth requirements higher — up to 20 Mb/s to 30 Mb/s per cell site. This increase is driven by packet traffic rather than voice traffic, so capacity and quality constraints are different.

As mobile network infrastructure evolves, IP-native base stations will have Ethernet interfaces rather than E1 or T1. This change in physical interfaces brings new challenges to backhaul networks; and because the transition will not happen overnight, backhaul networks must migrate gracefully while supporting a mixed payload of legacy TDM and growing packet traffic.

The evolution of microwave radio from TDM to packet technologies enables data–aware transport — which can support new high–bandwidth services while leveraging existing technologies. IP transformation typically seeks to achieve four major goals:

- Gradual transformation of the network — focusing on areas where compelling events force investment in a solution
- Return on these investments in less than two years, as a result of OPEX savings
- Minimized OPEX, despite capacity increases — which requires optimizing the use of scarce resources and aggregating all services over a single pipe, with no overlays
- Use of a multi-vendor model, with standard protocols and no proprietary equipment

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IP TRANSFORMATION DRIVERS

- **The need for additional connectivity** (ports) to introduce new broadband technologies and services (HSDPA, EV-DO, Wi-Fi hotspots, WiMAX)
- **Increased bandwidth requirements** for new packet-based services (20 Mb/s to 30 Mb/s per cell site)
- **Physical interface changes** (Ethernet base stations) which avoid the need for separate overlay networks to support Ethernet connectivity and backhaul

Figure 2. Traffic and Revenue Evolution with a Massive Introduction of Broadband Services. Data traffic is growing fast but revenues are not increasing at the same pace. You need more efficient ways to transport the additional packet traffic generated by broadband services.
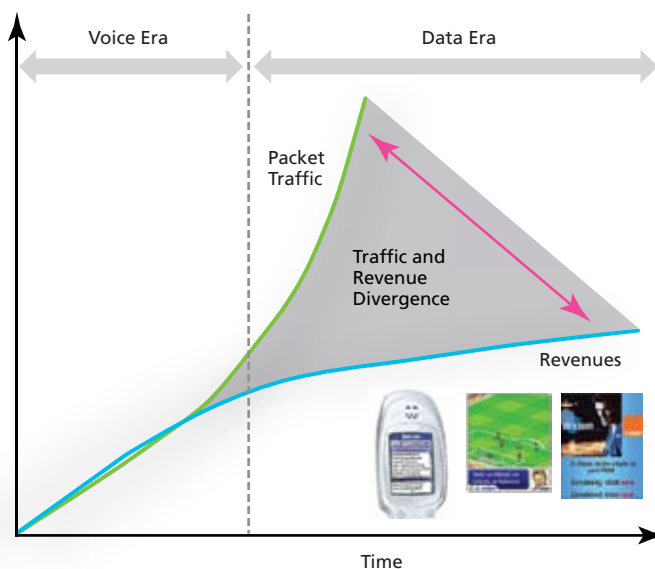
An Innovative, Truly Packet Product

The Alcatel-Lucent 9500 MPR helps ensure optimal performance for all types of backhauling technologies and enables smooth evolution of existing TDM-based networks to an all-IP network. It aggregates many kinds of incoming traffic, including 2G, 3G and WiMAX. High performance and low latency for each service and synchronization of these services is achieved along the entire backhauling network.

Service-Aware Transport

The Alcatel-Lucent 9500 MPR supports adaptive packet transport for exceptional use of radio frequency spectrum and a dramatic improvement in broadband traffic transmission. Our service-aware feature directly maps all traffic, both guaranteed and broadband, over the radio frame. It recognizes the traffic types in the incoming packets and automatically adapts to varying microwave link conditions. For instance, priority traffic, such as video and voice, are assigned to the most available packets across the radio link, while less time-dependent applications, such as Internet browsing and e-mail, are given access based on availability.

Simplified Growth

Because the Alcatel-Lucent 9500 MPR offers service-aware transport, you can increase the number of active users without the hassle of transport constraints. This system allows a dramatic increase in the number of broadband users — up to one hundred times that of E1- or T1-based TDM solutions. You also gain enhanced support for high-bandwidth applications, such as music downloading and streaming video.
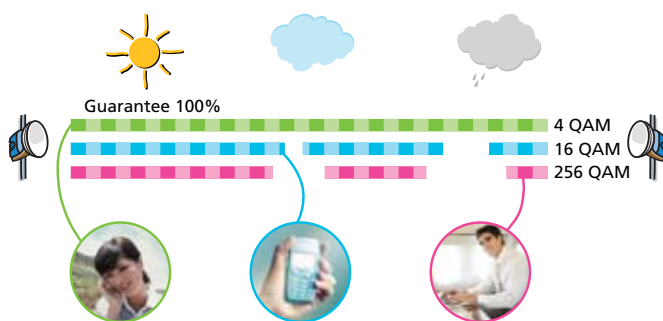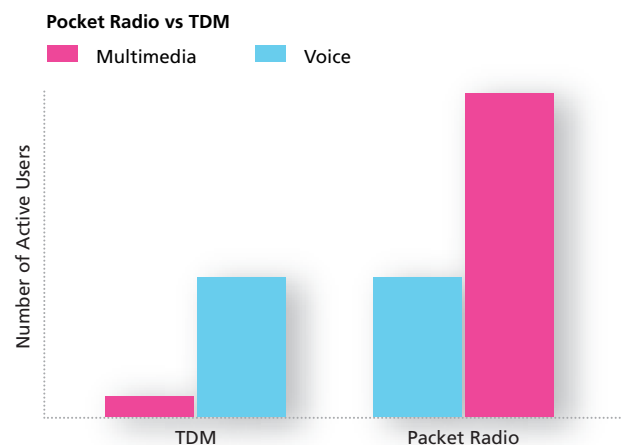
Figure 3. Adaptive Packet Radio Feature

Figure 4. Number of Active Users (Voice and Multimedia) with TDM and Packet Radio Solutions

Extending IP/MPLS from the Core to the Cell Site

The Alcatel-Lucent 9500 MPR product is part of an integrated end-to-end remote access network and core solution for complete IP transformation. Comprehensive, end-to-end monitoring of the entire IP remote access network helps ensure effective IP/MPLS management and reduces complexity.

Key Components

To integrate TDM, IP and microwave technologies, the Alcatel-Lucent 9500 MPR product is comprised of two main components: the Microwave Service Switch and the Universal Outdoor Unit.

Microwave Service Switch (MSS)

The MSS has the ability to aggregate any kind of TDM traffic, with any kind of packet traffic, over a single Ethernet connection. Different services can be dynamically managed, depending on radio performance levels at any given time, particularly in case of fading conditions.

Outdoor Unit (ODU)

A common ODU is available for the whole product family — both TDM traditional and IP microwave solutions. This allows smooth migration from TDM to packet networks and protects initial investments.

The Alcatel-Lucent 9500 MPR is transparent to microwave solutions, so it can be deployed in existing networks. This preserves your investments and offers seamless, cost-effective evolution from TDM to packet transport — on the schedule that best meets your needs.

Single Packet Node Characteristics

- Multiservice Switching Capacity: Greater than 10 Gb/s
- Radio throughput: Greater than 2 Gb/s
- Termination of 192xE1/T1 in circuit emulation
- No single point of failure
- Embedded synchronization distribution even in full Ethernet infrastructure
- Nodal SW configuration with a single packet matrix switching both Ethernet and TDM
- Standalone Site Aggregator compatible with any multivendor MW infrastructure

Microwave Service Switch (MSS)

Oudoor Unit (ODU)

Support Services

Alcatel-Lucent offers a full range of support services for streamlined, cost-effective IP transformation, including:

- Network design and planning
- Hotline
- Repair and return express, swap and repair, and spare parts management
- On-site visits, urgent interventions and technical assistance
- Training
- Bundled services during warranty period and warranty extensions

Key Features

Innovative Truly Packet Product

FEATURE	BENEFIT
The Multi-service aggregation layer feature aggregates and carries TDM 2G, 3G and IP/Ethernet over a common packet layer. This allows sharing of a common packet transmission infrastructure, regardless of the nature of the traffic carried. Mapping different access technologies over Ethernet is achieved by standardized protocols like circuit emulation and pseudo-wire.	There is a single transmission pipe for all services and access technologies on cell sites. Radio bandwidth is utilized at 100%. In contrast, TDM radio stacks multiple data streams (E1, Ethernet) over the radio channel and a large portion of the bandwidth is under-utilized.
With the Service Awareness feature, different end-user services data flows are treated according to their QoS requirements while with TDM products there is no possibility to differentiate services with different QoS requirements.	Operators achieve end-user satisfaction even while using services other than voice – using the minimum necessary bandwidth.
The 9500 MPR is a Packet Node meaning that it is on a single packet matrix with high switching capacity because of the common aggregation layer over Ethernet (greater than 10Gb/s)	9500 MPR is able to switch, aggregate and handle many incoming traffic types with almost no capacity limits (up to 10GB/s) and without additional external switches
The Service Driven Packet Adaptive Modulation feature allows full exploitation of the entire air bandwidth by changing modulation schemes according to propagation conditions, and associating different service quality to the available transport capacity.	Scarce spectrum resources are used efficiently in all conditions and at a lower cost than renting.

The Alcatel-Lucent Advantage

- Alcatel-Lucent is a leader in IP transformation and the migration to fully packet-based mobile networks. Our revolutionary wireless transmission solutions give you the next-generation back-hauling capabilities you need to compete in today's marketplace.

- Alcatel-Lucent is a leading vendor in microwave, IP and carrier Ethernet.
  ¬ We have shipped more than half a million microwave transceivers and have a presence in over 95 countries.
  ¬ We have more than 150 IP customers in over 65 countries, including 13 of the top 30 carriers globally.

- The Alcatel-Lucent integrated, optimized packet aggregation solution is the first in the market — optimized to transport all types of services over a single pipe.

- Alcatel-Lucent supports adaptive packet transport for maximum use of radio frequency spectrum, a dramatic improvement in broad-band traffic transmission and the required performance level for each service — to maintain end-user satisfaction.

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